

REMARKS

Favorable reconsideration is respectfully requested in view of the foregoing amendments and the following remarks.

Applicants are submitting the present Amendment without prejudice to the subsequent prosecution of claims to some or all of the subject matter which might be disclaimed by virtue of this paper (although none is believed to be), and explicitly reserve the right to pursue some or all of such subject matter, in Divisional or Continuation Applications.

**I. CLAIM STATUS AND AMENDMENTS**

Claims 1-13 were pending in this application when last examined and stand rejected.

Minor editorial revisions have been made to the claims to better conform to U.S. claim form. Such revisions are non-substantive and not intended to narrow the scope of protection. Such revisions include: revising the claims to use correct U.S. punctuation and grammar throughout; revising the claims to use proper antecedent basis throughout for the recited claim terminology.

Claim 4 is also amended to remove the parenthetical "especially" language, which is added back in new dependent claim 14.

Claim 11 is amended to proper Markush style format.

New claims 14-17 have been added.

New claims 14 and 15 are dependent on and find support in, claims 4 and 11, respectively. Specifically, new claim 14 is directed to the parenthetical expression removed from original claim 4. New 15 is directed to the "e.g. alcohol" feature removed from original claim 11.

Support for new claim 16 can be found in original claim 1.

New claim 17 corresponds to original claims 1, 6, and 9-10, and the disclosure, for example, at page 4, paragraphs [029], [031] and [032] of the instant application as represented by the international PCT application.

No new matter has been added by the above claim amendments.

Claims 1-17 are pending upon entry of this amendment.

Applicants thank the Examiner for the careful examination of this case, and respectfully request reexamination and reconsideration of the case, as amended. Below Applicants address the rejections levied in the Office Action, and explain why the rejections are not applicable to the pending claims as amended.

## **II. INDEFINITENESS REJECTION**

Claim 4 was rejected under 35 USC §112, second paragraph, as being indefinite for the reasons set forth on page 2 of the Official Action.

The present amendment overcomes this rejection by removing the parenthetical expression from claim 4 and adding it back as new dependent claim 14. Therefore, the rejection is untenable and should be withdrawn.

### **III. PRIOR ART REJECTIONS**

On page 3 of the Official Action, claims 1-8 and 11-13 were rejected under 35 U.S.C. § 102(b) as anticipated by CHRISTENSEN (U.S. Patent Application Publication 2003/0235985).

On page 4 of the Action, claims 9 and 10 were rejected under 35 U.S.C. § 103(a) as obvious over CHRISTENSEN et al. in view of BUCHANAN (U.S. Patent Application Publication 2003/0230549).

These rejections are respectfully traversed.

It is well established that to anticipate a claim, a cited prior art reference must disclose or suggest each and every element of the claimed invention. See, M.P.E.P. § 2131, and cases cited therein.

Similarly, to support a *prima facie* case of obviousness, the Office must provide a rationale showing that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions to yield predictable results. See, *KSR International Co. v.*

Teleflex Inc., 550 U.S. \_\_\_, \_\_\_, 82 USPQ2d 1385, 1395 (2007); and M.P.E.P. § 2143.02.

In the instant case, independent claim 1 recites "a method of selective etching comprising providing a first material selected from a group A on a substrate, providing a second material selected from a group B on a substrate, selectively etching said first material with a selectivity of at least 2:1 towards said second material by a liquid etchant flowing across the substrate at a flow sufficiently fast to generate a mean velocity v parallel to the surface of the substrate of at least 0.1 m/s." [Emphasis added.]

Applicants respectfully submit that neither CHRISTENSEN alone, nor the combination of CHRISTENSEN and BUCHANAN, disclose or suggest the above-emphasized feature of claim 1.

It is acknowledged that CHRISTENSEN discloses a method of selective etching comprising: providing a first material selected from a group A (high-k material namely  $Hf_xSi_yO_z$  or  $Zr_xSi_yO_z$ ) on a substrate; providing a second material selected from a group B ( $SO_2$  namely TEOS) on a substrate; and selectively etching said first material with a selectivity of at least 2:1 towards said second material.

However, nowhere does CHRISTENSEN disclose or suggest that selectivity is created or enhanced by a liquid etchant flowing across the substrate surface at a flow sufficiently fast to generate a mean velocity  $v$  parallel to the surface of the

substrate of at least 0.1 m/s as in claim 1 of the present application.

Accordingly, CHRISTENSEN cannot be said to disclose or suggest each and every element of independent claim 1 (i.e., the sole independent claim). As a result, CHRISTENSEN cannot anticipate the claims.

Further, it is noted that CHRISTENSEN discloses the use of spray processors (see paragraphs [0042] and [0043], where the liquid is supplied in form of small droplets. However, even if the liquid volume flow in CHRISTENSEN is above 0.5 lpm, this flow might not lead to "a flow sufficiently fast to generate a mean velocity  $v$  parallel to the surface of the substrate of at least 0.1 m/s" as required in claim 1 of the present application.

Indeed, in contrast to the method of claim 1 of the present application, CHRISTENSEN states (in paragraph [0043]) that:

The similarity between the etch results noted below in the examples utilizing a small, static volume of etching solution and a centrifugal spray processor with high cross-wafer flow rates indicates that the flow rate of etching solution over the wafer is not critical. [Emphasis added.]

This teaching clearly differs from what Applicants have found. In fact, it is contrary to claim 1 that requires "a flow sufficiently fast to generate a mean velocity  $v$  parallel to the surface of the substrate of at least 0.1 m/s". It is assumed that the "mean velocity  $v$  parallel to the substrate's surface" in

the examples of CHRISTENSEN was simply not high enough. Accordingly, CHRISTENSEN did not realize the fact that selectivity of etching high-k material against silicon dioxide can be created or enhanced as in the method of claim 1. Applicants respectfully submit that the above discussion is evidence that the combination of CHRISTENSEN and BUCHANAN would not yield predictable results to arrive at the claims as required for obviousness.

Applicants will now discuss further differences between CHRISTENSEN and the method in certain dependent claims of the instant application. One difference is that the liquid flow in the method of claim 2 is dispensed in a continuous flow and not in a disperse flow as in all spray-processors in the method in CHRISTENSEN. Thus, it is clear that CHRISTENSEN fails to disclose each and every feature of claim 2.

We note that CHRISTENSEN etches  $Hf_xSi_yO_z$  or  $Zr_xSi_yO_z$ , whereas in a preferred embodiment, Applicants etch  $HfO_2$  or  $ZrO_2$  as a first material that has been pretreated with an energetic particle bombardment. Such a difference in methodology could account for the reason Applicants experienced a different influence on velocity flow and selectivity. New claim 17 has been added to emphasize this difference.

Applicants will now discuss the secondary reference of BUCHANAN. This reference was relied upon for disclosing pretreatment consisting of energetic particle bombardment prior

to wet etching high-k metal oxides using fluoride or HF silicon oxide for the purpose of damaging the metal oxide and increase etch rate. However, such a teaching in no way discloses or suggests a liquid etchant flowing across the substrate surface at a flow sufficient fast to generate a mean velocity  $v$  parallel to the surface of the substrate of at least 0.1 m/s as in claim 1. Nothing in BUCHANAN suggests such. Accordingly, such a teaching in BUCHAHAN does not remedy the above-noted deficiencies in CHRISTENSEN.

Thus, Applicants respectfully submit that the Office has failed to show that the combination of CHRISTENSEN and BUCHANAN could provide for all the claimed elements and that one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions to yield predictable results.

For these reasons, CHRISTENSEN cannot anticipate claim 1 and the combination of CHRISTENSEN and BUCHANAN cannot render obvious claim 1. Accordingly, claim 1 is novel and unobvious over the CHRISTENSEN alone and over the combination of CHRISTENSEN and BUCHANAN. Likewise, dependent claims 2-13 are also novel and unobvious over the combined references in view of their dependency on claim 1.

Therefore, withdrawal of the above-noted anticipation and obviousness rejections is solicited.

**IV. CONCLUSION**

In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is in condition for allowance and early notice to that effect is respectfully requested.

If the Examiner has any comments or proposals for expediting prosecution, please contact the undersigned attorney at the telephone number below.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

YOUNG & THOMPSON

  
\_\_\_\_\_  
Jay F. Williams, Reg. No. 48,036  
209 Madison Street, Suite 500  
Alexandria, VA 22314  
Telephone (703) 521-2297  
Telefax (703) 685-0573  
(703) 979-4709

JFW/fb